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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/764,520	01/27/2004	Tokihiro Nishihara	020494A	9968

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EXAMINER

ESTRADA, MICHELLE

ART UNIT PAPER NUMBER

2823

DATE MAILED: 12/22/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

EV

<b>Office Action Summary</b>	<b>Application No.</b>	<b>Applicant(s)</b>	
	10/764,520	NISHIHARA ET AL.	
	<b>Examiner</b>	<b>Art Unit</b>	
	Michelle Estrada	2823	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 27 January 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 27-31 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 27-31 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☒ Certified copies of the priority documents have been received in Application No. 10/117,219.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date <u>1/27/04</u> . | 6) <input type="checkbox"/> Other: _____  |

**DETAILED ACTION*****Claim Objections***

Claim 28 is objected to because of the following informalities: The term "deep" in claim 28 is a relative term which renders the claim indefinite. The term "deep" is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention. If Applicant intends any particular strength or duration of the RIE it should be clearly recited. Appropriate correction is required.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 27, 28, 30 and 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lin et al. (6,924,583) in view of Sumi (6,402,303).

Lin et al. disclose preparing a substrate (401) including a first surface and a second surface opposite to said first surface; forming a resonator assembly which includes a first electrode (404) held in contact with said first surface, a piezoelectric layer (403) formed on the first electrode and a second electrode (402) formed on the piezoelectric layer; and forming a cavity on the substrate, the

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cavity being disposed at a location corresponding to the resonator assembly, the cavity being opened in said first surface and said second surface (See fig. 4); wherein the cavity includes a side surface extending in a substantially perpendicular direction to said first surface.

Lin et al. do not specifically disclose forming the cavity by dry etching the substrate.

Sumi discloses dry etching a cavity on a substrate (20), which has a piezoelectric formed therein (Col. 10, lines 1-5).

It would have been within the scope of one of ordinary skill in the art to combine the teachings of Lin et al. and Sumi to enable the cavity formation step of Lin et al. to be performed according to the teachings of Sumi because one of ordinary skill in the art would have been motivated to look to alternative suitable methods of performing the disclosed cavity formation step of Lin et al. and art recognized suitability for an intended purpose has been recognized to be motivation to combine. See MPEP 2144.07.

Re claim 28, Sumi disclose wherein the dry etching is deep-RIE.

Re claim 30, Sumi discloses wherein a groove for dividing the substrate is also formed by etching at the cavity-forming step.

Re claim 31, Lin et al. disclose preparing a substrate (401) including a first surface and a second surface opposite to said first surface; forming a resonator assembly which includes a first electrode (404) held in contact with said first surface, a piezoelectric layer (403) formed on the first electrode and a second electrode (402) formed on the piezoelectric layer; and forming a cavity on the

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substrate, the cavity being disposed at a location corresponding to the resonator assembly, the cavity being opened in said first surface and said second surface (See fig. 4); wherein the first electrode and the piezoelectric layer are partially exposed to the cavity at the cavity-forming step.

Lin et al. do not specifically disclose forming the cavity by dry etching the substrate.

Sumi discloses dry etching a cavity on a substrate (20), which has a piezoelectric formed therein (Col. 10, lines 1-5).

It would have been within the scope of one of ordinary skill in the art to combine the teachings of Lin et al. and Sumi to enable the cavity formation step of Lin et al. to be performed according to the teachings of Sumi because one of ordinary skill in the art would have been motivated to look to alternative suitable methods of performing the disclosed cavity formation step of Lin et al. and art recognized suitability for an intended purpose has been recognized to be motivation to combine. See MPEP 2144.07.

Claim 29 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lin et al. in view of Sumi as applied to claims 27, 28, 30 and 31 above, and further in view of Hasegawa et al. (2002/0011986).

The combination does not disclose further comprising the step of bonding a cover substrate to said second surface so as to close the cavity.

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Hasegawa et al. disclose further comprising the step of bonding a cover substrate (506) to said second surface so as to close the cavity (See fig. 9 and page 5, [0069]).

It would have been within the scope of one of ordinary skill in the art to combine the teachings of Lin et al., Sumi and Hasegawa et al. to enable the cover substrate formation step of Hasegawa et al. to be performed in the process of the combination to allow the piezoelectric to vibrate and supply a voltage amplified alternating signal to the lower electrode.

### ***Conclusion***

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michelle Estrada whose telephone number is 571-272-1858. The examiner can normally be reached on Monday through Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew Smith can be reached on 571-272-1907. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 571-272-2800.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Michelle Estrada  
Patent Examiner  
Art Unit 2823

ME

December 19, 2005